

SEQUENCE LISTING

<110> UNIVERSITY OF MARYLAND
UNITED STATES GOVERNMENT, as represented by
Department of Veterans Affairs
TRUCKSIS, Michele

<120> VIRULENCE GENES OF M. MARINUM AND M. TUBERCULOSIS

<130> VET 1 WO

<140>
<141>

<160> 46

<170> PatentIn Ver. 2.1

<210> 1
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 1
ctaggtacct acaacctc 18

<210> 2
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 2
catggtaccc attctaac 18

<210> 3
<211> 89
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: template RT1
oligonucleotide

<220>
<223> "n" represents a, t, c, g, other or unknown

<400> 3
ctaggtacct acaacctcaa gcttnknknk nknknknknk nknknknknk nknknknknk 60
nknkaagctt ggtagaatg ggtaccatg 89

<210> 4
 <211> 169
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 41.2

<220>
 <223> "n" represents a, t, c, g, other or unknown

<400> 4
 cgggccgatac tatgacgagn acgacgggac agatgggtcc ccggatggtc tacaccgaga 60
 ccaaactgaa ctctgtcttc tccttcggcg ggcccaagtg tctggtgaag gtgatccaaa 120
 aactgtccgg gttgagcatc aaccggttca tcgccatcga ctctgtcgg 169

<210> 5
 <211> 55
 <212> PRT
 <213> Mycobacterium marinum

<220>
 <223> Mutant 41.2

<220>
 <223> "Xaa" represents any, other or unknown amino acid

<400> 5
 Gly Arg Ser Met Thr Xaa Thr Thr Gly Gln Met Gly Pro Arg Met Val
 1 5 10 15
 Tyr Thr Glu Thr Lys Leu Asn Ser Ser Phe Ser Phe Gly Gly Pro Lys
 20 25 30
 Cys Leu Val Lys Val Ile Gln Lys Leu Ser Gly Leu Ser Ile Asn Arg
 35 40 45
 Phe Ile Ala Ile Asp Phe Val
 50 55

<210> 6
 <211> 382
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 80.1

<220>
 <223> "n" represents a, t, c, g, other or unknown

<400> 6
 acctcctgaa tgtgtgacat ggccctagaa ccttgcntta gactatattac atacatggct 60
 tcaccggcc gcctgtgcca ctcataagac tactggaatg gaccaacaat cgcacagtca 120
 tctgaagcag gagtctgtta atcacaggcc ctgaaggaaac agtgactgtg cagagaaaga 180

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cggaatgca tcctgttaac taagtggctg gaggagtgcc aggtcattcc aaagaacatc 240
cctgaaatct ggaggagaag gtatagttag ccccccaaaa ttccaactgg agacatcana 300
ccagagtctc tactgagctg ccaagcttgc ggccgcactc gagtaactag ttaacccttt 360
ggggcctcta aacgggtctt ga                                     382

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<210> 7

<211> 121

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 80.1

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 7

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Pro Pro Glu Cys Val Thr Trp Pro Asn Pro Ala Leu Asp Tyr Leu His
  1                      5                      10                      15

```

```

Thr Trp Leu His Pro Ala Ala Cys Ala Thr His Lys Thr Thr Gly Met
      20                      25                      30

```

```

Asp Gln Gln Ser His Ser His Leu Lys Gln Glu Ser Val Asn His Arg
      35                      40                      45

```

```

Pro Arg Asn Ser Asp Cys Ala Glu Lys Asp Gly Asn Ala Ser Cys Leu
      50                      55                      60

```

```

Ser Gly Trp Arg Ser Ala Arg Ser Phe Gln Arg Thr Ser Leu Lys Ser
      65                      70                      75                      80

```

```

Gly Gly Glu Gly Ile Val Ser Thr Pro Lys Phe Gln Leu Glu Thr Ser
      85                      90                      95

```

```

Xaa Gln Ser Leu Tyr Ala Ala Lys Leu Ala Ala Ala Leu Glu Leu Val
      100                      105                      110

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Asn Pro Leu Gly Pro Leu Asn Gly Ser
      115                      120

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<210> 8

<211> 172

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 86.1

<400> 8

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tcacgcgctaa ccggttgagc taccgcccgc acagcgtgcc catcatctcc aacctgaccg 60
gctcacttgc cacagtcgag caactcacat cgccccgcta ttgggcacag catgtacggg 120
agccagtgcg gtttcatgac ggcgttaccg gcttgttggc aggcggagaa ca          172

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<210> 9

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4

<211> 55
 <212> PRT
 <213> Mycobacterium marinum

<220>
 <223> Mutant 86.1

<400> 9
 Ala Asn Arg Leu Ser Tyr Arg Pro His Ser Val Pro Ile Ile Ser Asn
 1 5 10 15

Leu Thr Gly Ser Leu Ala Thr Val Glu Gln Leu Thr Ser Pro Arg Tyr
 20 25 30

Trp Ala Gln His Val Arg Glu Pro Val Arg Phe His Asp Gly Val Thr
 35 40 45

Gly Leu Leu Ala Gly Gly Glu
 50 55

<210> 10
 <211> 228
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 62.2

<400> 10
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 gcttggtgcgg cttgcgatgg gtcggtgctg tcggtgccgg tgcctccggt gccgccttgg 120
 cctccggttc cgccggtgcc gccctggcgg ccggcgccctt ggatgccgcc ggtgccgggtt 180
 ccggtctgcac cgcccgttcc gccggttccg cctgcgcgcg cggtgcct 228

<210> 11
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 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 62.2

<220>
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 <222> (1)..(225)

<400> 11
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 Gly Thr Gly Gly Ala Gly Gly Thr Gly Gly Thr Gly Gly Ala Ala Gly
 1 5 10 15
 acc ggc acc ggc ggc atc caa ggc gcc ggc ggc cag ggc ggc acc ggc 96
 Thr Gly Thr Gly Gly Ile Gln Gly Ala Gly Gly Gln Gly Gly Thr Gly
 20 25 30

gga acc gga ggc caa ggc ggc acc gga ggc acc ggc acc gac agc acc 144
Gly Thr Gly Gly Gln Gly Gly Thr Gly Gly Thr Gly Thr Asp Ser Thr
35 40 45

gac cca tgc caa gcc gca caa gcc ggc ggc cag ggc ggc gtc ggc ggt 192
Asp Pro Ser Gln Ala Ala Gln Ala Gly Gly Gln Gly Gly Val Gly Gly
50 55 60

act ggt ggc gcg gcc ggt caa ggc ggc acc gga 225
Thr Gly Gly Ala Ala Gly Gln Gly Gly Thr Gly
65 70 75

<210> 12

<211> 75

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 62.2

<400> 12

Gly Thr Gly Gly Ala Gly Gly Thr Gly Gly Thr Gly Gly Ala Ala Gly
1 5 10 15

Thr Gly Thr Gly Gly Ile Gln Gly Ala Gly Gly Gln Gly Gly Thr Gly
20 25 30

Gly Thr Gly Gly Gln Gly Gly Thr Gly Gly Thr Gly Thr Asp Ser Thr
35 40 45

Asp Pro Ser Gln Ala Ala Gln Ala Gly Gly Gln Gly Gly Val Gly Gly
50 55 60

Thr Gly Gly Ala Ala Gly Gln Gly Gly Thr Gly
65 70 75

<210> 13

<211> 285

<212> DNA

<213> *Mycobacterium marinum*

<220>

<223> Mutant 67.1

<400> 13

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tttcgtcgac	ctctcgggca	cccatgaatc	ccgatagtgg	cgtgaagaaa	ccgtacgaga	120
tgtgatcac	ctcgtggcga	gtcgccttcg	atatcgggat	gcgcaccaat	ccctcaatcc	180
ggcggggcac	gttttccctt	tccacctgt	cgacgagtgg	gtgtccgcta	tgggcctaaat	240
aatccatctt	gctgcctctt	tctgaaatcg	aattttattac	tatcg		280

<210> 14

<211> 93

<212> PRT

<213> *Mycobacterium marinum*

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6

<220>

<223> Mutant 67.1

<400> 14

Ser Lys Thr Ile Gly Met Leu His Ser Val Pro Ser Gly Ser Cys Met
 1 5 10 15
 Leu Ser Arg Val Ser Ser Thr Ser Arg Arg Pro Met Asn Pro Asp Ser
 20 25 30
 Gly Val Lys Lys Pro Tyr Glu Met Leu Ile Thr Ser Trp Ala Val Ala
 35 40 45
 Phe Asp Ile Gly Met Arg Thr Asn Pro Ser Ile Arg Pro Ala Thr Phe
 50 55 60
 Ser Leu Ser Thr Leu Ser Thr Ser Gly Cys Pro Leu Trp Pro Lys Ser
 65 70 75 80
 Ile Leu Leu Pro Leu Ser Glu Ile Glu Phe Ile Thr Ile
 85 90

<210> 15

<211> 90

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 15

Val Glu Asp Tyr Arg Tyr Ala Pro Arg Ser Val Gly Lys Leu His Val
 1 5 10 15
 Val Lys Gly Phe Val Asp Leu Ser Ala Thr His Glu Ser Arg Trp Arg
 20 25 30
 Glu Glu Thr Val Arg Asp Ala Asp His Leu Val Gly Gly Arg Leu Arg
 35 40 45
 Tyr Arg Asp Ala His Gln Ser Leu Asn Pro Ala Gly His Val Phe Pro
 50 55 60
 Phe His Pro Val Asp Glu Trp Val Ser Val Met Ala Ile Ile His Leu
 65 70 75 80
 Ala Ala Ser Phe Asn Arg Ile Tyr Tyr Tyr
 85 90

<210> 16

<211> 92

<212> PRT

<213> Mycobacterium marinum

<220>

<223> 67.1

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7

<400> 16

Gly Arg Arg Leu Ser Val Cys Ser Ile Ala Phe Arg Arg Glu Ala Ala
 1 5 10 15

Cys Cys Gln Gly Phe Arg Arg Pro Leu Gly Asp Pro Ile Pro Ile Val
 20 25 30

Ala Arg Asn Arg Thr Arg Cys Ser Pro Arg Gly Arg Ser Pro Ser Ile
 35 40 45

Ser Gly Cys Ala Pro Ile Pro Gln Ser Gly Arg Pro Arg Phe Pro Phe
 50 55 60

Pro Pro Cys Arg Arg Val Gly Val Arg Tyr Gly Leu Asn Asn Pro Ser
 65 70 75 80

Cys Cys Leu Phe Leu Lys Ser Asn Leu Leu Leu Ser
 85 90

<210> 17

<211> 285

<212> DNA

<213> *Mycobacterium marinum*

<220>

<223> Mutant 67.1

<400> 17

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 gacacccact cgtcgacagg gtggaaaggg aaaacgtggc cggccggatt gagggattgg 120
 tgcgcacccc gatatcgaag gcgaccgccc acgaggtgat cagcatctcg tacggtttct 180
 tcacgccact atcgggattc atgggtcgcc gagaggtcga cgaaaccctt gacaacatgc 240
 agcttcccga cggaaacgcta tggagcatac cgatagtctt cgacc 285

<210> 18

<211> 89

<212> PRT

<213> *Mycobacterium marinum*

<220>

<223> Mutant 67.1

<400> 18

Arg Ile Arg Phe Gln Lys Glu Ala Ala Arg Trp Ile Ile Ala Ile Thr
 1 5 10 15

Asp Thr His Ser Ser Thr Gly Trp Lys Gly Lys Thr Trp Pro Ala Gly
 20 25 30

Leu Arg Asp Trp Cys Ala Ser Arg Tyr Arg Arg Arg Pro Pro Thr Arg
 35 40 45

Ser Ala Ser Arg Thr Val Ser Ser Arg His Tyr Arg Asp Ser Trp Val
 50 55 60

Ala Glu Arg Ser Thr Lys Pro Leu Thr Thr Cys Ser Phe Pro Thr Glu
 65 70 75 80

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8

Arg Tyr Gly Ala Tyr Arg Ser Ser Thr
85

<210> 19

<211> 91

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 19

Asp Ser Asn Lys Phe Asp Phe Arg Lys Arg Gln Gln Asp Gly Leu Phe
1 5 10 15

Arg Pro Arg Thr Pro Thr Arg Arg Gln Gly Gly Lys Gly Lys Arg Gly
20 25 30

Arg Pro Asp Gly Ile Gly Ala His Pro Asp Ile Glu Gly Asp Arg Pro
35 40 45

Arg Gly Asp Gln His Leu Val Arg Phe Leu His Ala Thr Ile Gly Ile
50 55 60

His Gly Ser Pro Arg Gly Arg Arg Asn Pro Gln His Ala Ala Ser Arg
65 70 75 80

Arg Asn Ala Met Glu His Thr Asp Ser Leu Arg
85 90

<210> 20

<211> 94

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 20

Ile Val Ile Asn Ser Ile Ser Glu Arg Gly Ser Lys Met Asp Tyr Leu
1 5 10 15

Gly His Asn Gly His Pro Leu Val Asp Arg Val Glu Arg Glu Asn Val
20 25 30

Ala Gly Arg Ile Glu Gly Leu Val Arg Ile Pro Ile Ser Lys Ala Thr
35 40 45

Ala His Glu Val Ile Ser Ile Ser Tyr Gly Phe Phe Thr Pro Leu Ser
50 55 60

Gly Phe Met Gly Arg Arg Glu Val Asp Glu Thr Leu Asp Asn Met Gln
65 70 75 80

Leu Pro Asp Gly Thr Leu Trp Ser Ile Pro Ile Val Phe Asp
85 90

<210> 21
 <211> 167
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 80.8

<400> 21
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 ccactaaaat tcgcggggccc cgatcggcga cattactoga cggttttcgg gggaatctca 120
 gcggtgatgg cattcttgag ggcgacgtag cgtttggcgt cgggatac 167

<210> 22
 <211> 53
 <212> PRT
 <213> Mycobacterium marinum

<220>
 <223> Mutant 80.8

<400> 22
 Asp Pro Asp Ala Lys Arg Tyr Val Ala Leu Lys Asn Ala Ile Thr Ala
 1 5 10 15
 Glu Ile Pro Pro Lys Thr Val Glu Cys Arg Arg Ser Gly Pro Ala Asn
 20 25 30
 Phe Ser Gly Ser Asn Leu Ile Cys Ser Pro Trp Arg Ala Arg Pro Arg
 35 40 45
 Asn Asn Gln Leu Ile
 50

<210> 23
 <211> 144
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 39.

<400> 23
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 gccctggctg agaaccagga acccattctc ggggcaatct acggtccagc gaagcaactt 120
 ctgcactacg cggccaaagg ggct 144

<210> 24
 <211> 46
 <212> PRT
 <213> Mycobacterium marinum

<220>
 <223> Mutant 39.2

<400> 24

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10

Leu Asp Gly Thr Lys Glu Phe Ile Lys Gly Ser Asp Glu Phe Thr Val
 1 5 10 15

Asn Ile Ala Leu Val Glu Asn Gln Glu Pro Ile Leu Gly Ala Ile Tyr
 20 25 30

Gly Pro Ala Lys Gln Leu Leu His Tyr Ala Ala Lys Gly Ala
 35 40 45

<210> 25

<211> 381

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 114.7

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 25

agccgtattt cgccattgag agttgggggtc ttgagatcgg cactggaagg ggacagcgtg 60
 ctattgcctc ttggtcgcgc cttgccacct gatgctgtgg cggctaaacg gggtagtcg 120
 gggctgctct gcggcttgct ggttcgcctc agctggggta cggccgttcc gccggatgac 180
 tacnaccatt gggcaccgga gcctgaagaa ggcgcgcgagg ccgtggtcga agaaaacgtg 240
 gatgcggcag ctgccggtac cgacgagtgg gacgagtggg cggaatggag ggagtgggag 300
 gcagcaaattg cccgaacctc attttcgaga tgccccgtac cagcagccgt gatacccgaa 360
 ctgcgcggcg gccggttgag a 381

<210> 26

<211> 122

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 114.7

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 26

Leu Arg Val Gly Val Leu Arg Ser Ala Leu Glu Gly Asp Ser Val Leu
 1 5 10 15

Leu Pro Leu Gly Pro Pro Leu Pro Pro Asp Ala Val Ala Ala Lys Arg
 20 25 30

Gly Glu Ser Gly Leu Leu Cys Gly Leu Ser Val Pro Leu Ser Trp Gly
 35 40 45

Thr Ala Val Pro Pro Asp Asp Tyr Xaa His Trp Ala Pro Glu Pro Glu
 50 55 60

Glu Gly Ala Glu Ala Val Val Glu Glu Asn Val Asp Ala Ala Ala Ala
 65 70 75 80

<400> 29
tttgcaatcc acctgtacgc ggaactnttn annnccgttt tgccttgncg aataagctag 60

ct

62

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<210> 30
<211> 19
<212> PRT
<213> Mycobacterium marinum
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<220>
<223> Mutant 42.2

<220>
<223> "Xaa" represents any, other or unknown amino acid

<400> 30
Ser Leu Ile Arg Gln Gly Lys Thr Xaa Xaa Xaa Ser Ser Ala Tyr Arg
1 5 10 15

Trp Ile Ala

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<210> 31
<211> 74
<212> DNA
<213> Mycobacterium marinum
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<220>
<223> Mutant 60.2

<220>
<223> "n" represents a, t, c, g, other or unknown

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<400> 31
ccanacctat ctgtttncag ntnnagacna cggmatetca cgcgnttggg cccngccacc 60
aaacgcccgc tnga                                     74
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<210> 32
<211> 24
<212> PRT
<213> Mycobacterium marinum
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<220>
<223> Mutant 60.2

<220>
<223> "Xaa" represents any, other or unknown amino acid

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<400> 32
Xaa Pro Ile Cys Xaa Gln Xaa Xaa Thr Thr Xaa Ser His Ala Xaa Gly
  1                      5              10                15
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Pro Xaa His Gln Thr Pro Arg Xaa
20

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<210> 33
<211> 24
<212> PRT
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13

<213> Mycobacterium marinum

<220>

<223> Mutant 60.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 33

Xaa	Thr	Tyr	Leu	Phe	Xaa	Xaa	Xaa	Asp	Xaa	Gly	Ile	Ser	Arg	Xaa	Trp
1				5				10						15	

Ala	Xaa	Pro	Pro	Asn	Ala	Ala	Xaa
				20			

<210> 34

<211> 24

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 60.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 34

Pro	Xaa	Leu	Ser	Val	Xaa	Xaa	Xaa	Arg	Xaa	Arg	Xaa	Leu	Thr	Arg	Leu
1				5				10						15	

Gly	Pro	Ala	Thr	Lys	Arg	Arg	Val
				20			

<210> 35

<211> 74

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 60.2

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 35

tcnaccgcggc	gtttggtggc	ngggcccaan	cgcgtgagat	nccgtngtct	naanctgnaa	60
acagataggt	ntgg					74

<210> 36

<211> 24

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 60.2

<220>

14

<223> "Xaa" represents any, other or unknown amino acid

<400> 36

Ser Thr Arg Arg Leu Val Ala Gly Pro Xaa Arg Val Arg Xaa Arg Xaa
 1 5 10 15

Leu Xaa Leu Xaa Thr Asp Arg Xaa
 20

<210> 37

<211> 23

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 60.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 37

Xaa Arg Gly Val Trp Trp Xaa Gly Pro Xaa Ala Asp Xaa Val Val Xaa
 1 5 10 15

Xaa Xaa Lys Gln Ile Gly Xaa
 20

<210> 38

<211> 23

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 60.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 38

Xaa Ala Ala Phe Gly Gly Xaa Ala Gln Xaa Arg Glu Xaa Pro Xaa Ser
 1 5 10 15

Xaa Xaa Xaa Asn Arg Val Trp
 20

<210> 39

<211> 247

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 68.6

<400> 39

aaatcatcat ctatcggttac ccgggggcaag ccaagcacct cagcaaaaat tctgcagagc 60
 atttcctctt gcggagttcg cggcatacgg ccaatcgccg catgatgac gggcacaggc 120
 agcgctttac gatccacert cttattcgga gttaacggca tgggtctcaag tcttacgatg 180
 acagacggca ccatatattc ggccagtttc agggaggcgt agcgccgcag ttctgctgta 240

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15

tctatca

247

<210> 40

<211> 81

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 68.6

<400> 40

Ile Asp Thr Ala Glu Leu Arg Arg Tyr Ala Ser Leu Lys Leu Ala Glu
 1 5 10 15

Tyr Met Val Pro Ser Val Ile Val Arg Leu Glu Thr Met Pro Leu Thr
 20 25 30

Pro Asn Lys Lys Val Asp Arg Lys Ala Leu Pro Val Pro Asp His His
 35 40 45

Ala Ala Ile Gly Arg Met Pro Arg Thr Pro Gln Glu Glu Met Leu Cys
 50 55 60

Arg Ile Phe Ala Glu Val Leu Gly Leu Pro Arg Val Thr Ile Asp Asp
 65 70 75 80

Asp

<210> 41

<211> 164

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 95.3

<400> 41

gattagctta ttccctcaagg cactgagcgat tagcttattc ctcaaggcac gagcgactag 60
 cttattcctc aaggcactg cttcgactt gacggtgtag agctcaatag cttattcctc 120
 aaggcactg ctcgacttcg cacttgacgg tctagagctc aaag 164

<210> 42

<211> 50

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 95.3

<400> 42

Asp Leu Ile Pro Gln Gly Thr Ser Asp Leu Ile Pro Gln Gly Thr Ser
 1 5 10 15

Asp Leu Ile Pro Gln Gly Thr Ser Phe Ala Leu Asp Gly Val Glu Leu
 20 25 30

Asn Ser Leu Phe Leu Lys Ala Arg Ala Arg Leu Arg Thr Arg Cys Arg
 35 40 45

Ala Gln
 50

<210> 43
 <211> 138
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 39.2

<220>
 <221> CDS
 <222> (1)..(138)

<400> 43
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 Leu Asp Gly Thr Lys Glu Phe Ile Lys Gly Ser Asp Glu Phe Thr Val
 1 5 10 15
 aac atc gcc ctg gtc gag aac cag gaa ccc att ctc ggg gca atc tac 96
 Asn Ile Ala Leu Val Glu Asn Gln Glu Pro Ile Leu Gly Ala Ile Tyr
 20 25 30
 ggt cca gcg aag caa ctt ctg cac tac gcg gcc aaa ggg gct 138
 Gly Pro Ala Lys Gln Leu Leu His Tyr Ala Ala Lys Gly Ala
 35 40 45

<210> 44
 <211> 366
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 114.7
 <220>
 <223> "n" represents a, t, c, g, other or unknown

<220>
 <221> CDS
 <222> (1)..(366)

<400> 44
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 Leu Arg Val Gly Val Leu Arg Ser Ala Leu Glu Gly Asp Ser Val Leu
 1 5 10 15
 ttg cct ctt ggt ccg ccc ttg cca cct gat gct gtg gcg gct aaa cgg 96
 Leu Pro Leu Gly Pro Pro Leu Pro Pro Asp Ala Val Ala Ala Lys Arg
 20 25 30


```

ggc gag tgc ggg ctg ctc tgc ggc ttg tgc gtt ccg ctc agc tgg ggt 144
Gly Glu Ser Gly Leu Leu Cys Gly Leu Ser Val Pro Leu Ser Trp Gly
      35              40              45

acg gcc gtt ccg ccg gat gac tac nac cat tgg gca ccg gag cct gaa 192
Thr Ala Val Pro Pro Asp Asp Tyr Xaa His Trp Ala Pro Glu Pro Glu
      50              55              60

gaa ggc gcc gag gcc gtg gtc gaa gaa aac gtg gat gcg gca gct gcc 240
Glu Gly Ala Glu Ala Val Val Glu Glu Asn Val Asp Ala Ala Ala Ala
      65              70              75              80

ggc acc gac gag tgg gac gag tgg gcg gaa tgg agg gag tgg gag gca 288
Gly Thr Asp Glu Trp Asp Glu Trp Ala Glu Trp Arg Glu Trp Glu Ala
      85              90              95

gca aat gcc cga acc tca ttt tgc aga tgc ccc gta cca gca gcc gtg 336
Ala Asn Ala Arg Thr Ser Phe Ser Arg Cys Pro Val Pro Ala Ala Val
      100              105              110

ata ccc gaa ctc gcc ggc ggc cgg ttg aga 366
Ile Pro Glu Leu Ala Gly Gly Arg Leu Arg
      115              120

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<210> 45

<211> 12

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
Oligonucleotide

<400> 45

gacgctcgt gc

12

<210> 46

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
Oligonucleotide

<400> 46

ttattcctca aggcacgagc gatcc

25

SEQUENCE LISTING

<110>TRUCKSIS, Michele

<120> VIRULENCE GENES OF M. MARINUM AND M. TUBERCULOSIS

<130> VET 1 WO

<140>

<141>

<160> 46

<170> PatentIn Ver. 2.1

<210> 1

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 1

ctaggtacct acaacctc 18

<210> 2

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 2

catggtaccc attctaac 18

<210> 3

<211> 89

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template RT1
oligonucleotide

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 3

ctaggtacct acaacctcaa gcttnknknk nknknknknk nknknknknk nknknknknk 60
nknkaagcct ggtagaatg ggtaccatg 89

<210> 4

<211> 169

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 41.2

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 4

cgggccgac tatgacgagn acgacgggac agatgggtcc ccgatggtc tacaccgaga 60
ccaaactgaa ctcgtcgttc tccttcggcg ggcccaagtg tctggtgaag gtgatccaaa 120
aactgtccgg gttgagcatc aaccggttca tcgcatcga cttcgtcgg 169

<210> 5

<211> 55

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 41.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 5

Gly Arg Ser Met Thr Xaa Thr Thr Gly Gln Met Gly Pro Arg Met Val
1 5 10 15

Tyr Thr Glu Thr Lys Leu Asn Ser Ser Phe Ser Phe Gly Gly Pro Lys
 20 25 30

Cys Leu Val Lys Val Ile Gln Lys Leu Ser Gly Leu Ser Ile Asn Arg
 35 40 45

Phe Ile Ala Ile Asp Phe Val
 50 55

<210> 6

<211> 382

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 80.1

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 6

acctcctgaa tgtgtgacat ggcctagaa ccctgcntta gactatttac ataatggct 60
 tcacccggcc gcctgtgcca ctcataagac tactggaatg gaccaacaat cgcacagtca 120
 tctgaagcag gactgtgta atcacaggcc ctgaaggaa agtgactgtg cagagaaaga 180
 cggcaatgca tctgttaac taagtggctg gaggagtgcc aggtcattcc aaagaacatc 240
 cctgaaatct ggaggagaag gtatagttag caccctaaaa ttcaactgg agacatcana 300
 ccagagtctc tactgagctg ccaagcttgc ggccgcactc gagtaactag ttaaccctt 360
 ggggcctcta aacgggtctt ga 382

<210> 7

<211> 121

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 80.1

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 7

Pro Pro Glu Cys Val Thr Trp Pro Asn Pro Ala Leu Asp Tyr Leu His
 1 5 10 15

Thr Trp Leu His Pro Ala Ala Cys Ala Thr His Lys Thr Thr Gly Met
 20 25 30

Asp Gln Gln Ser His Ser His Leu Lys Gln Glu Ser Val Asn His Arg
 35 40 45

Pro Arg Asn Ser Asp Cys Ala Glu Lys Asp Gly Asn Ala Ser Cys Leu
 50 55 60

Ser Gly Trp Arg Ser Ala Arg Ser Phe Gln Arg Thr Ser Leu Lys Ser
 65 70 75 80

Gly Gly Glu Gly Ile Val Ser Thr Pro Lys Phe Gln Leu Glu Thr Ser
 85 90 95

Xaa Gln Ser Leu Tyr Ala Ala Lys Leu Ala Ala Ala Leu Glu Leu Val
 100 105 110

Asn Pro Leu Gly Pro Leu Asn Gly Ser
 115 120

<210> 8

<211> 172

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 86.1

<400> 8

tcacgctaa ccggttgagc taccgcccgc acagcgtgcc catcatctcc aacctgaccg 60
 gctcacttgc cacagtcgag caactcacat cgccccgcta ttgggcacag catgtacggg 120
 agccagtgcg gttcatgac ggcgttaccg gcttggtggc aggcggagaa ca 172

<210> 9

<211> 55

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 86.1

<400> 9

Ala Asn Arg Leu Ser Tyr Arg Pro His Ser Val Pro Ile Ile Ser Asn

1 5 10 15

Leu Thr Gly Ser Leu Ala Thr Val Glu Gln Leu Thr Ser Pro Arg Tyr

20 25 30

Trp Ala Gln His Val Arg Glu Pro Val Arg Phe His Asp Gly Val Thr

35 40 45

Gly Leu Leu Ala Gly Gly Glu

50 55

<210> 10

<211> 228

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 62.2

<400> 10

gatccggtgc cgcccttgacc ggccgcgcca ccagtaccgc cgacgccgcc ctggccgccg 60

gcttgtagcg cttgcgatgg gtcggtgctg tcggtgccgg tgcctccggt gccgccttgg 120

cctccggttc cgccggtgcc gccctggccg ccggcgccctt ggatgccgcc ggtgccggtt 180

ccggctgcac cgcccggtcc gccggttccg cctgcgccgc cgggtgcct 228

<210> 11

<211> 225

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 62.2

<220>

<221> CDS

<222> (1)..(225)

<400> 11

ggc acc ggc ggc gca ggc gga acc ggc gga acg ggc ggt gca gcc gga 48
 Gly Thr Gly Gly Ala Gly Gly Thr Gly Gly Thr Gly Gly Ala Ala Gly
 1 5 10 15

acc ggc acc ggc ggc atc caa ggc gcc ggc ggc cag ggc ggc acc ggc 96
 Thr Gly Thr Gly Gly Ile Gln Gly Ala Gly Gly Gln Gly Gly Thr Gly
 20 25 30

gga acc gga ggc caa ggc ggc acc gga ggc acc ggc acc gac agc acc 144
 Gly Thr Gly Gly Gln Gly Gly Thr Gly Gly Thr Gly Thr Asp Ser Thr
 35 40 45

gac cca tcg caa gcc gca caa gcc ggc ggc cag ggc ggc gtc ggc ggt 192
 Asp Pro Ser Gln Ala Ala Gln Ala Gly Gly Gln Gly Gly Val Gly Gly
 50 55 60

act ggt ggc gcg gcc ggt caa ggc ggc acc gga 225
 Thr Gly Gly Ala Ala Gly Gln Gly Gly Thr Gly
 65 70 75

<210> 12

<211> 75

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 62.2

<400> 12

Gly Thr Gly Gly Ala Gly Gly Thr Gly Gly Thr Gly Gly Ala Ala Gly
 1 5 10 15

Thr Gly Thr Gly Gly Ile Gln Gly Ala Gly Gly Gln Gly Gly Thr Gly
 20 25 30

Gly Thr Gly Gly Gln Gly Gly Thr Gly Gly Thr Gly Thr Asp Ser Thr
 35 40 45

Asp Pro Ser Gln Ala Ala Gln Ala Gly Gly Gln Gly Gly Val Gly Gly
 50 55 60

Thr Gly Gly Ala Ala Gly Gln Gly Gly Thr Gly
65 70 75

<210> 13

<211> 285

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 13

ggtcgaagac tatcggatg ctccatagcg ttccgtcggg aagctgcatg ttgtcaaggg 60
tttcgtcgac ctctcggcga cccatgaatc ccgatatggg cgtgaagaaa ccgtacgaga 120
tgctgatcac ctctgtggcgg gtcgccttcg atatcgggat gcgcaccaat ccctcaatcc 180
ggccggccac gttttccctt tccaccctgt cgacgagtgg gtgtccgta tggcctaaat 240
aatccatctt gctgcctctt tctgaaatcg aatttattac tatcg 285

<210> 14

<211> 93

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 14

Ser Lys Thr Ile Gly Met Leu His Ser Val Pro Ser Gly Ser Cys Met
1 5 10 15

Leu Ser Arg Val Ser Ser Thr Ser Arg Arg Pro Met Asn Pro Asp Ser
20 25 30

Gly Val Lys Lys Pro Tyr Glu Met Leu Ile Thr Ser Trp Ala Val Ala
35 40 45

Phe Asp Ile Gly Met Arg Thr Asn Pro Ser Ile Arg Pro Ala Thr Phe
50 55 60

Ser Leu Ser Thr Leu Ser Thr Ser Gly Cys Pro Leu Trp Pro Lys Ser
65 70 75 80

Ile Leu Leu Pro Leu Ser Glu Ile Glu Phe Ile Thr Ile
 85 90

<210> 15

<211> 90

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 15

Val Glu Asp Tyr Arg Tyr Ala Pro Arg Ser Val Gly Lys Leu His Val
 1 5 10 15

Val Lys Gly Phe Val Asp Leu Ser Ala Thr His Glu Ser Arg Trp Arg
 20 25 30

Glu Glu Thr Val Arg Asp Ala Asp His Leu Val Gly Gly Arg Leu Arg
 35 40 45

Tyr Arg Asp Ala His Gln Ser Leu Asn Pro Ala Gly His Val Phe Pro
 50 55 60

Phe His Pro Val Asp Glu Trp Val Ser Val Met Ala Ile Ile His Leu
 65 70 75 80

Ala Ala Ser Phe Asn Arg Ile Tyr Tyr Tyr
 85 90

<210> 16

<211> 92

<212> PRT

<213> Mycobacterium marinum

<220>

<223> 67.1

<400> 16

Gly Arg Arg Leu Ser Val Cys Ser Ile Ala Phe Arg Arg Glu Ala Ala
 1 5 10 15

Cys Cys Gln Gly Phe Arg Arg Pro Leu Gly Asp Pro Ile Pro Ile Val

20 25 30

Ala Arg Asn Arg Thr Arg Cys Ser Pro Arg Gly Arg Ser Pro Ser Ile
35 40 45

Ser Gly Cys Ala Pro Ile Pro Gln Ser Gly Arg Pro Arg Phe Pro Phe
50 55 60

Pro Pro Cys Arg Arg Val Gly Val Arg Tyr Gly Leu Asn Asn Pro Ser
65 70 75 80

Cys Cys Leu Phe Leu Lys Ser Asn Leu Leu Leu Ser
85 90

<210> 17

<211> 285

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 17

cgatagtaat aaattcgatt tcagaaagag gcagcaagat ggattattta ggccataacg 60
gacaccact cgtcgacagg gtggaaaggg aaaacgtggc cggccggatt gagggattgg 120
tgcgcatccc gatatcgaag gcgaccgccc acgaggtgat cagcatctcg tacggttct 180
tcacgccact atcgggatc atgggtcgcc gagaggtcga cgaaaccctt gacaacatgc 240
agcttcccga cggaacgcta tggagcatat cgatagtctt cgacc 285

<210> 18

<211> 89

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 18

Arg Ile Arg Phe Gln Lys Glu Ala Ala Arg Trp Ile Ile Ala Ile Thr
1 5 10 15

Asp Thr His Ser Ser Thr Gly Trp Lys Gly Lys Thr Trp Pro Ala Gly

20 25 30
 Leu Arg Asp Trp Cys Ala Ser Arg Tyr Arg Arg Pro Pro Thr Arg
 35 40 45
 Ser Ala Ser Arg Thr Val Ser Ser Arg His Tyr Arg Asp Ser Trp Val
 50 55 60
 Ala Glu Arg Ser Thr Lys Pro Leu Thr Thr Cys Ser Phe Pro Thr Glu
 65 70 75 80
 Arg Tyr Gly Ala Tyr Arg Ser Ser Thr
 85

<210> 19
 <211> 91
 <212> PRT
 <213> Mycobacterium marinum

<220>
 <223> Mutant 67.1

<400> 19
 Asp Ser Asn Lys Phe Asp Phe Arg Lys Arg Gln Gln Asp Gly Leu Phe
 1 5 10 15
 Arg Pro Arg Thr Pro Thr Arg Arg Gln Gly Gly Lys Gly Lys Arg Gly
 20 25 30
 Arg Pro Asp Gly Ile Gly Ala His Pro Asp Ile Glu Gly Asp Arg Pro
 35 40 45
 Arg Gly Asp Gln His Leu Val Arg Phe Leu His Ala Thr Ile Gly Ile
 50 55 60
 His Gly Ser Pro Arg Gly Arg Arg Asn Pro Gln His Ala Ala Ser Arg
 65 70 75 80
 Arg Asn Ala Met Glu His Thr Asp Ser Leu Arg
 85 90

<210> 20
 <211> 94

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 67.1

<400> 20

Ile Val Ile Asn Ser Ile Ser Glu Arg Gly Ser Lys Met Asp Tyr Leu

1 5 10 15

Gly His Asn Gly His Pro Leu Val Asp Arg Val Glu Arg Glu Asn Val

20 25 30

Ala Gly Arg Ile Glu Gly Leu Val Arg Ile Pro Ile Ser Lys Ala Thr

35 40 45

Ala His Glu Val Ile Ser Ile Ser Tyr Gly Phe Phe Thr Pro Leu Ser

50 55 60

Gly Phe Met Gly Arg Arg Glu Val Asp Glu Thr Leu Asp Asn Met Gln

65 70 75 80

Leu Pro Asp Gly Thr Leu Trp Ser Ile Pro Ile Val Phe Asp

85 90

<210> 21

<211> 167

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 80.8

<400> 21

ccaattagct gattattcct cgggcgtgct caacgccaag gactacatat caggttactt 60

ccactaaaat tcgcggggccc cgatcggcga cattactcga cggtttcgg gggaatctca 120

gcggtgatgg cattcttgag ggcgacgtag cgtttggcgt cgggatc 167

<210> 22

<211> 53

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 80.8

<400> 22

Asp Pro Asp Ala Lys Arg Tyr Val Ala Leu Lys Asn Ala Ile Thr Ala

1 5 10 15

Glu Ile Pro Pro Lys Thr Val Glu Cys Arg Arg Ser Gly Pro Ala Asn

20 25 30

Phe Ser Gly Ser Asn Leu Ile Cys Ser Pro Trp Arg Ala Arg Pro Arg

35 40 45

Asn Asn Gln Leu Ile

50

<210> 23

<211> 144

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 39.

<400> 23

gatccgctgg acggcaccaa agaattcattc aagggcagcg atgagttcac cgtcaacatc 60

gccctggtcg agaaccagga acccattctc ggggcaatct acggtccagc gaagcaactt 120

ctgcactacg cggccaaagg ggct 144

<210> 24

<211> 46

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 39.2

<400> 24

Leu Asp Gly Thr Lys Glu Phe Ile Lys Gly Ser Asp Glu Phe Thr Val

1 5 10 15

Asn Ile Ala Leu Val Glu Asn Gln Glu Pro Ile Leu Gly Ala Ile Tyr

20 25 30

Gly Pro Ala Lys Gln Leu Leu His Tyr Ala Ala Lys Gly Ala
 35 40 45

<210> 25

<211> 381

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 114.7

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 25

agccgtattt cgccattgag agttggggtc ttgagatcgg cactggaagg ggacagcgtg 60
 ctattgcctc ttgtccgcc cttgccacct gatgctgtgg cggctaaacg ggttgagtcg 120
 gggctgctct gcggctgtgc ggttccgctc agctggggta cggccgttcc gccggatgac 180
 tacnaccatt gggcaccgga gcctgaagaa ggcgccgagg ccgtggtcga agaaaacgtg 240
 gatgcggcag ctgccgttac cgacgagtgg gacgagtggg cggaatggag ggagtgggag 300
 gcagcaaatg cccgaacctc atttcgaga tgccccgtac cagcagccgt gatacccgaa 360
 ctgcgccggc gccggttgag a 381

<210> 26

<211> 122

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 114.7

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 26

Leu Arg Val Gly Val Leu Arg Ser Ala Leu Glu Gly Asp Ser Val Leu
 1 5 10 15

Leu Pro Leu Gly Pro Pro Leu Pro Pro Asp Ala Val Ala Ala Lys Arg
 20 25 30

Gly Glu Ser Gly Leu Leu Cys Gly Leu Ser Val Pro Leu Ser Trp Gly
 35 40 45

Thr Ala Val Pro Pro Asp Asp Tyr Xaa His Trp Ala Pro Glu Pro Glu
 50 55 60

Glu Gly Ala Glu Ala Val Val Glu Glu Asn Val Asp Ala Ala Ala Ala
 65 70 75 80

Gly Thr Asp Glu Trp Asp Glu Trp Ala Glu Trp Arg Glu Trp Glu Ala
 85 90 95

Ala Asn Ala Arg Thr Ser Phe Ser Arg Cys Pro Val Pro Ala Ala Val
 100 105 110

Ile Pro Glu Leu Ala Gly Gly Arg Leu Arg
 115 120

<210> 27

<211> 98

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 32.2

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 27

tccanncaga ggngcacgta gancgtagga cggaangcgg ngngatcgnc aatacggctg 60
 gcncctgnag aactgntcga gggcctgcng ctggggcc 98

<210> 28

<211> 32

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 32.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 28

Ala Pro Ala Ala Gly Pro Arg Xaa Val Leu Ala Xaa Pro Ala Val Leu
1 5 10 15

Xaa Ile Xaa Pro Xaa Ser Val Leu Arg Ser Thr Cys Xaa Ser Xaa Trp
20 25 30

<210> 29

<211> 62

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 42.2

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 29

tttgcaatcc acctgtacgc ggaactnttn annnccggtt tgccttgncg aataagctag 60
ct 62

<210> 30

<211> 19

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 42.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 30

Ser Leu Ile Arg Gln Gly Lys Thr Xaa Xaa Xaa Ser Ser Ala Tyr Arg
1 5 10 15

Trp Ile Ala

<210> 31
 <211> 74
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 60.2

<220>
 <223> "n" represents a, t, c, g, other or unknown

<400> 31
 ccanacctat ctgtttncag ntnagacna cggnatctca cgcgnttggg ccngccacc 60
 aaacgccgcg tnga 74

<210> 32
 <211> 24
 <212> PRT
 <213> Mycobacterium marinum

<220>
 <223> Mutant 60.2

<220>
 <223> "Xaa" represents any, other or unknown amino acid

<400> 32
 Xaa Pro Ile Cys Xaa Gln Xaa Xaa Thr Thr Xaa Ser His Ala Xaa Gly
 1 5 10 15

Pro Xaa His Gln Thr Pro Arg Xaa
 20

<210> 33
 <211> 24
 <212> PRT
 <213> Mycobacterium marinum

<220>
 <223> Mutant 60.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 33

Xaa Thr Tyr Leu Phe Xaa Xaa Xaa Asp Xaa Gly Ile Ser Arg Xaa Trp
1 5 10 15

Ala Xaa Pro Pro Asn Ala Ala Xaa
20

<210> 34

<211> 24

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 60.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 34

Pro Xaa Leu Ser Val Xaa Xaa Xaa Arg Xaa Arg Xaa Leu Thr Arg Leu
1 5 10 15

Gly Pro Ala Thr Lys Arg Arg Val
20

<210> 35

<211> 74

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 60.2

<220>

<223> "n" represents a, t, c, g, other or unknown

<400> 35

tcnaccgaggc gtttggtggc ngggcccaan cgcgtgagat nccgtngtct naanctgnaa 60
acagataggt ntgg 74

<210> 36
<211> 24
<212> PRT
<213> Mycobacterium marinum

<220>
<223> Mutant 60.2

<220>
<223> "Xaa" represents any, other or unknown amino acid

<400> 36
Ser Thr Arg Arg Leu Val Ala Gly Pro Xaa Arg Val Arg Xaa Arg Xaa
1 5 10 15

Leu Xaa Leu Xaa Thr Asp Arg Xaa
20

<210> 37
<211> 23
<212> PRT
<213> Mycobacterium marinum

<220>
<223> Mutant 60.2

<220>
<223> "Xaa" represents any, other or unknown amino acid

<400> 37
Xaa Arg Gly Val Trp Trp Xaa Gly Pro Xaa Ala Asp Xaa Val Val Xaa
1 5 10 15

Xaa Xaa Lys Gln Ile Gly Xaa
20

<210> 38
<211> 23
<212> PRT
<213> Mycobacterium marinum

<220>
<223> Mutant 60.2

<220>

<223> "Xaa" represents any, other or unknown amino acid

<400> 38

Xaa Ala Ala Phe Gly Gly Xaa Ala Gln Xaa Arg Glu Xaa Pro Xaa Ser
1 5 10 15

Xaa Xaa Xaa Asn Arg Val Trp
20

<210> 39

<211> 247

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 68.6

<400> 39

aaatcatcat ctatcgttac ccggggcaag ccaagcacct cagcaaaaat tctgcagagc 60
atttctctt gcggagttcg cggcatacgg ccaatcgccg catgatgatc gggcacaggc 120
agcgctttac gatccacctt cttattcgga gttaacggca tggctcgaag tcttacgatg 180
acagacggca ccatatattc ggccagtgc agggaggcgt agcgccgcag ttctgctgta 240
tctatca 247

<210> 40

<211> 81

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 68.6

<400> 40

Ile Asp Thr Ala Glu Leu Arg Arg Tyr Ala Ser Leu Lys Leu Ala Glu
1 5 10 15

Tyr Met Val Pro Ser Val Ile Val Arg Leu Glu Thr Met Pro Leu Thr
20 25 30

Pro Asn Lys Lys Val Asp Arg Lys Ala Leu Pro Val Pro Asp His His
35 40 45

Ala Ala Ile Gly Arg Met Pro Arg Thr Pro Gln Glu Glu Met Leu Cys
 50 55 60

Arg Ile Phe Ala Glu Val Leu Gly Leu Pro Arg Val Thr Ile Asp Asp
 65 70 75 80

Asp

<210> 41

<211> 164

<212> DNA

<213> Mycobacterium marinum

<220>

<223> Mutant 95.3

<400> 41

gattagctta ttctcaagg cagcagcgat tagcttattc ctcaaggcac gagcgactag 60
 cttattcctc aaggcacgag ctgcgactt gacgggttag agtcaatag cttattcctc 120
 aaggcacgag ctgcacttcg cacttgacgg ttagagctc aaag 164

<210> 42

<211> 50

<212> PRT

<213> Mycobacterium marinum

<220>

<223> Mutant 95.3

<400> 42

Asp Leu Ile Pro Gln Gly Thr Ser Asp Leu Ile Pro Gln Gly Thr Ser
 1 5 10 15

Asp Leu Ile Pro Gln Gly Thr Ser Phe Ala Leu Asp Gly Val Glu Leu
 20 25 30

Asn Ser Leu Phe Leu Lys Ala Arg Ala Arg Leu Arg Thr Arg Cys Arg
 35 40 45

Ala Gln
 50

<210> 43
 <211> 138
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 39.2

<220>
 <221> CDS
 <222> (1)..(138)

<400> 43
 ctg gac ggc acc aaa gaa ttc atc aag ggc agc gat gag ttc acc gtc 48
 Leu Asp Gly Thr Lys Glu Phe Ile Lys Gly Ser Asp Glu Phe Thr Val
 1 5 10 15

aac atc gcc ctg gtc gag aac cag gaa ccc att ctc ggg gca atc tac 96
 Asn Ile Ala Leu Val Glu Asn Gln Glu Pro Ile Leu Gly Ala Ile Tyr
 20 25 30

ggt cca gcg aag caa ctt ctg cac tac gcg gcc aaa ggg gct 138
 Gly Pro Ala Lys Gln Leu Leu His Tyr Ala Ala Lys Gly Ala
 35 40 45

<210> 44
 <211> 366
 <212> DNA
 <213> Mycobacterium marinum

<220>
 <223> Mutant 114.7

<220>
 <223> "n" represents a, t, c, g, other or unknown

<220>
 <221> CDS
 <222> (1)..(366)

<400> 44

ttg aga gtt ggg gtc ttg aga tcg gca ctg gaa ggg gac agc gtg cta 48
 Leu Arg Val Gly Val Leu Arg Ser Ala Leu Glu Gly Asp Ser Val Leu
 1 5 10 15

ttg cct ctt ggt ccg ccc ttg cca cct gat gct gtg gcg gct aaa cgg 96
 Leu Pro Leu Gly Pro Pro Leu Pro Pro Asp Ala Val Ala Ala Lys Arg
 20 25 30

ggt gag tcg ggg ctg ctc tgc ggc ttg tcg gtt ccg ctc agc tgg ggt 144
 Gly Glu Ser Gly Leu Leu Cys Gly Leu Ser Val Pro Leu Ser Trp Gly
 35 40 45

acg gcc gtt ccg ccg gat gac tac nac cat tgg gca ccg gag cct gaa 192
 Thr Ala Val Pro Pro Asp Asp Tyr Xaa His Trp Ala Pro Glu Pro Glu
 50 55 60

gaa ggc gcc gag gcc gtg gtc gaa gaa aac gtg gat gcg gca gct gcc 240
 Glu Gly Ala Glu Ala Val Val Glu Glu Asn Val Asp Ala Ala Ala Ala
 65 70 75 80

ggt acc gac gag tgg gac gag tgg gcg gaa tgg agg gag tgg gag gca 288
 Gly Thr Asp Glu Trp Asp Glu Trp Ala Glu Trp Arg Glu Trp Glu Ala
 85 90 95

gca aat gcc cga acc tca ttt tcg aga tgc ccc gta cca gca gcc gtg 336
 Ala Asn Ala Arg Thr Ser Phe Ser Arg Cys Pro Val Pro Ala Ala Val
 100 105 110

ata ccc gaa ctc gcc ggc ggc cgg ttg aga 366
 Ile Pro Glu Leu Ala Gly Gly Arg Leu Arg
 115 120

<210> 45
 <211> 12
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 Oligonucleotide

<400> 45

gatcgctcgt gc

12

<210> 46

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
Oligonucleotide

<400> 46

ttattcctca aggcacgagc gatcc

25